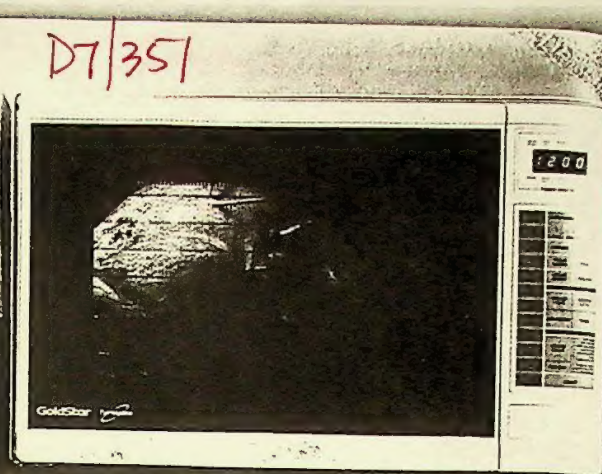
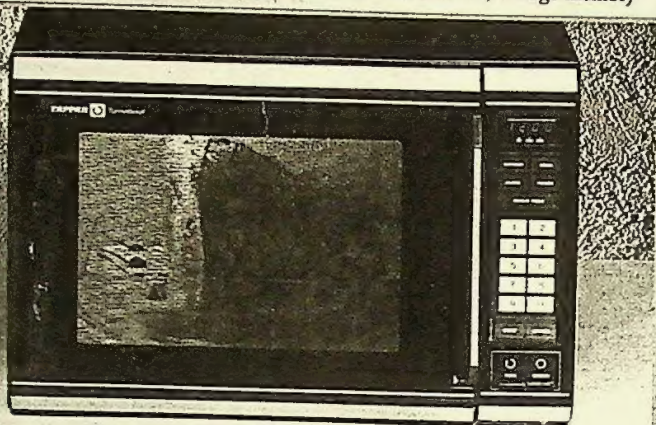




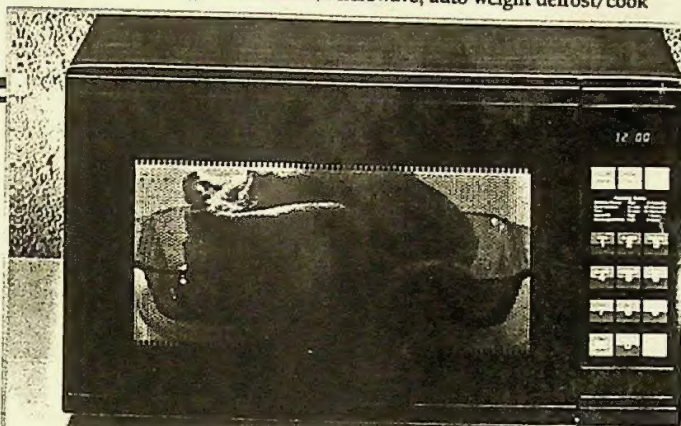
1 Convection/Microwave; 4-stage memory



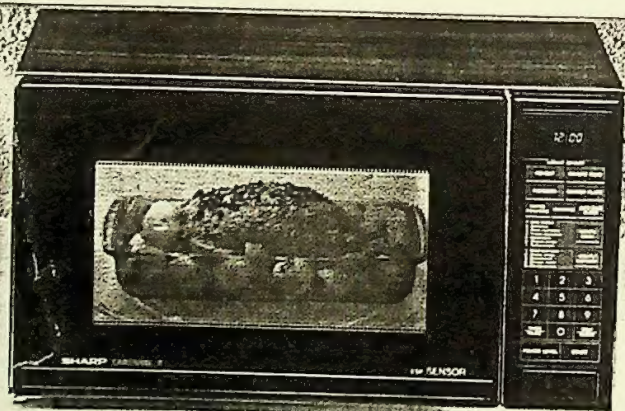
2 Convection/Microwave; auto weight defrost/cook



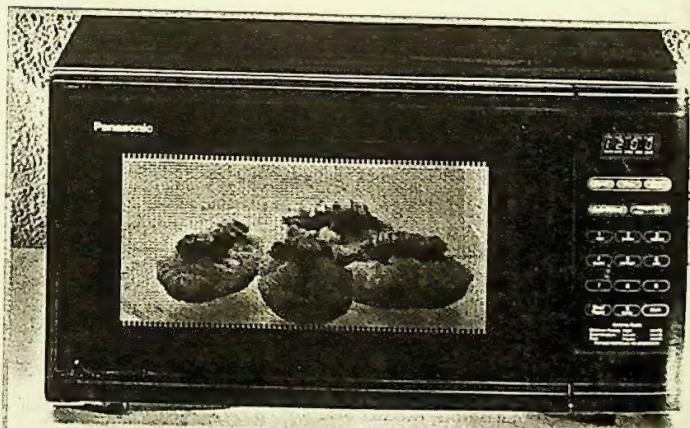
3 Browning element; defrost by weight



4 3-stage memory Item may vary from illustration



5 Compu-Cook/defrost; popcorn sensor

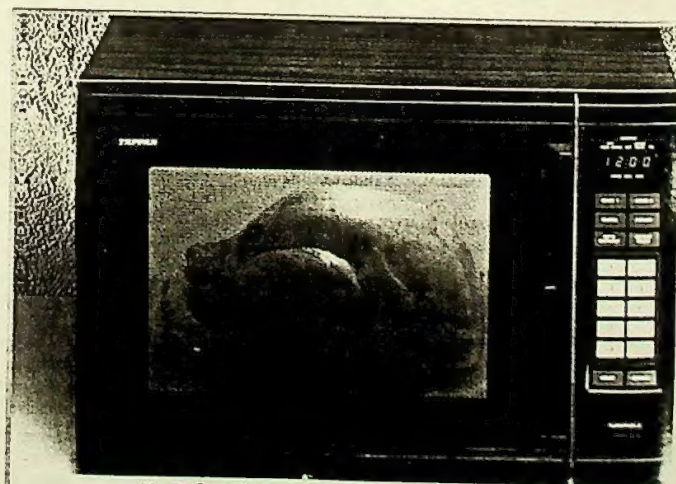


6 Auto weight defrost/reheat; 3-stage memory

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7 Defrost by weight; 2-stage memory

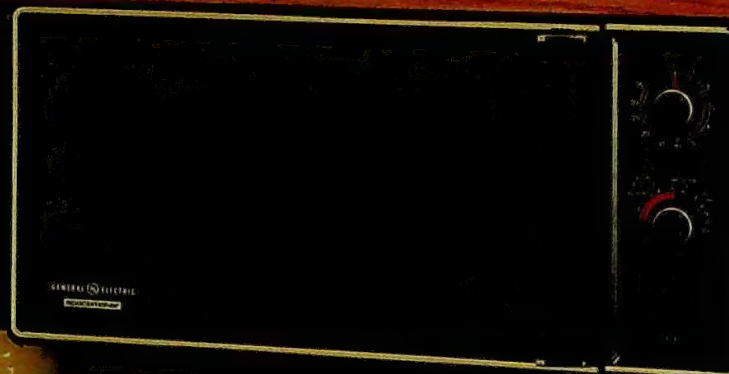


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**G.E. Spacemaker II with 35-minute timer, time cook 22A.** Orig. 370.00. Variable power levels. Installs under most cabinets in 3 easy steps. The .8 cu. ft. capacity can handle most cooking needs. Choose the power level you need; increase or decrease cooking speed as you wish.



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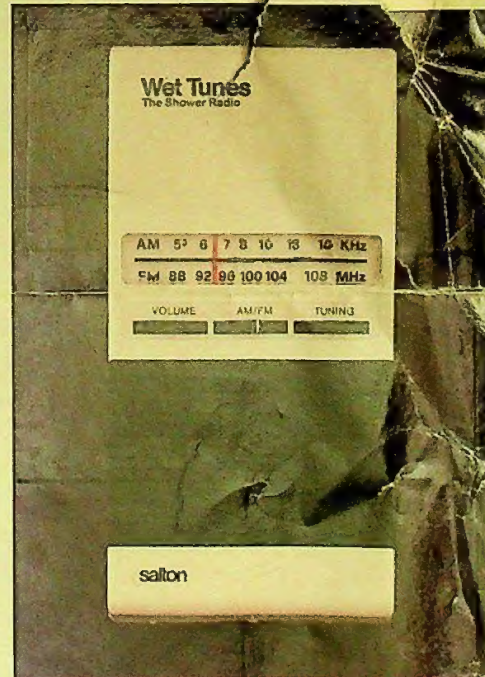
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Note: pages 5-10 and 12 are cut off at bottom on original. This is the best copy possible.

<sup>(12)</sup> UK Patent Application <sup>(19)</sup> GB <sup>(11)</sup> 2 055 280 A

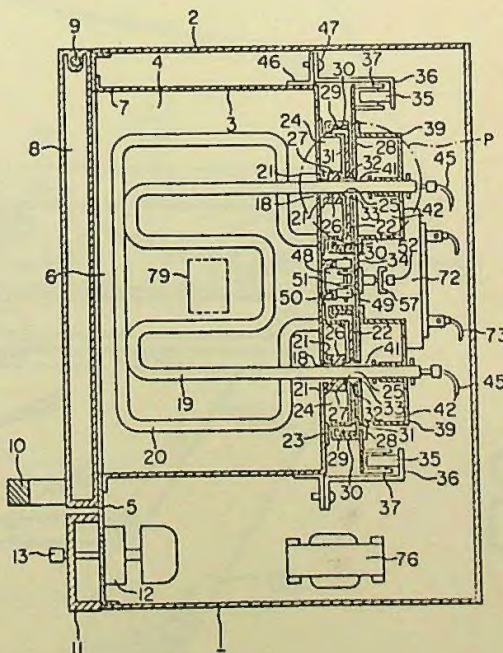
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- (22) Date of filing 30 Jul 1980
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- (32) 30 Jul 1979  
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25 Feb 1981
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(54) A high frequency heating apparatus

(57) A microwave oven has a vertically translatable resistance heater (19) the two end portions of which extend from the interior of the heating chamber (4) to the exterior thereof through a pair of parallel vertically elongated openings (18). The leakage of microwaves through the elongated openings (18) is prevented for the most part by annular choke spaces (24) which are situated around the elongated openings (18) and have communication ports (26)

adjacent the extending portions of said heater (19) and through which microwaves leaking from the interior of the heating chamber (4) through the elongated openings (18) are introduced, thereby extinguishing the microwaves leaking through the elongated openings (18). Other auxiliary means for preventing the leakage of the microwaves, such as absorbers, attenuators, or further choke spaces may also be used together with said choke spaces (24). Vertically movable food-supports or temperature sensors may be provided with similar leakage-prevention.

FIG. 4



The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

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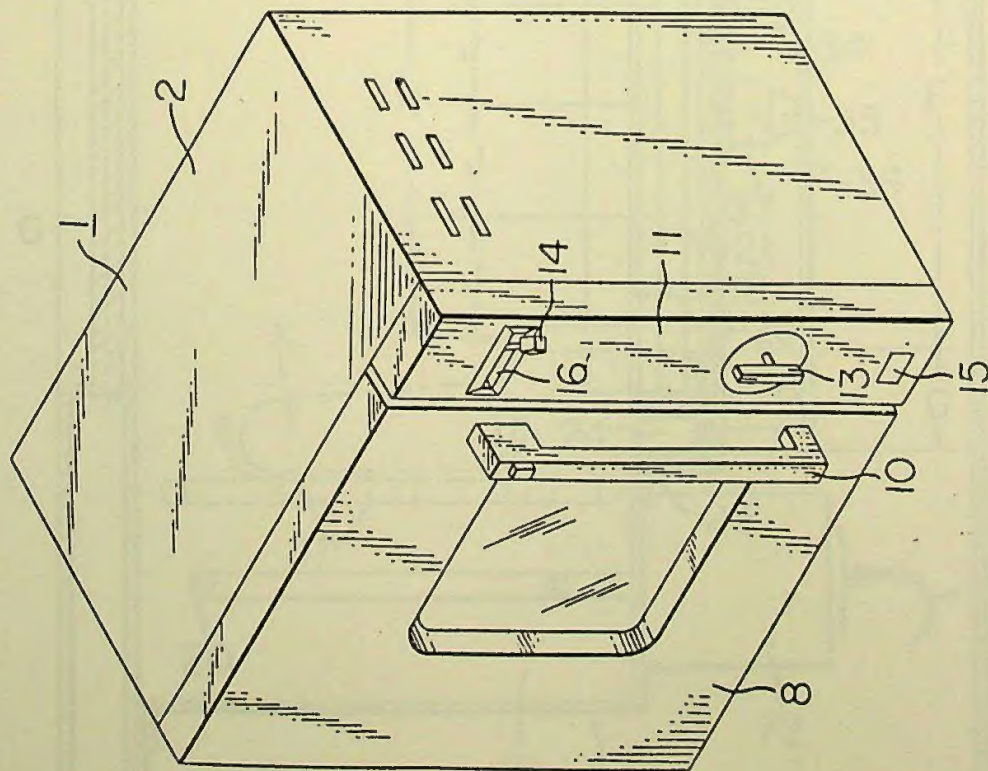


FIG. 1

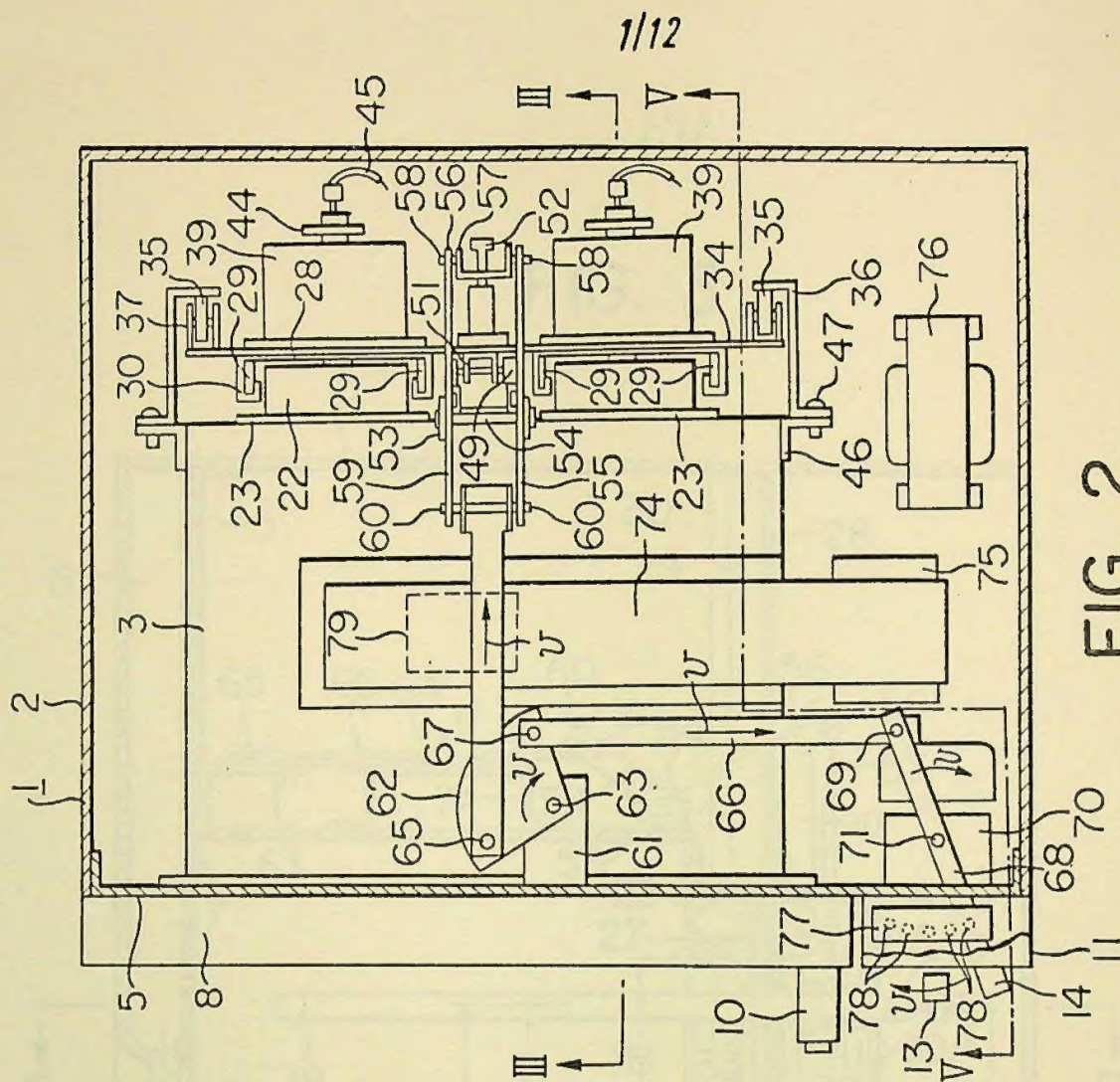


FIG. 2



FIG. 3

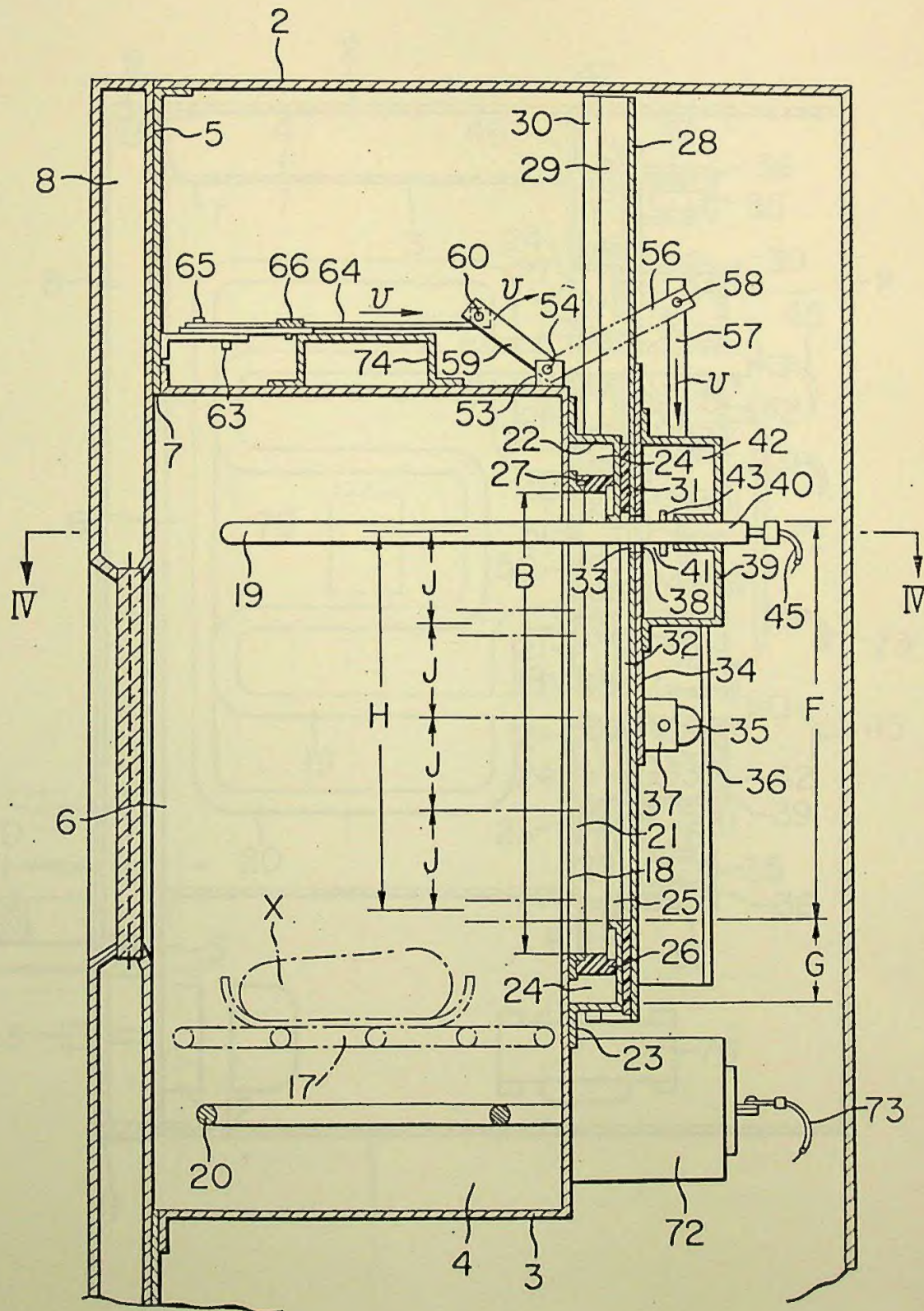
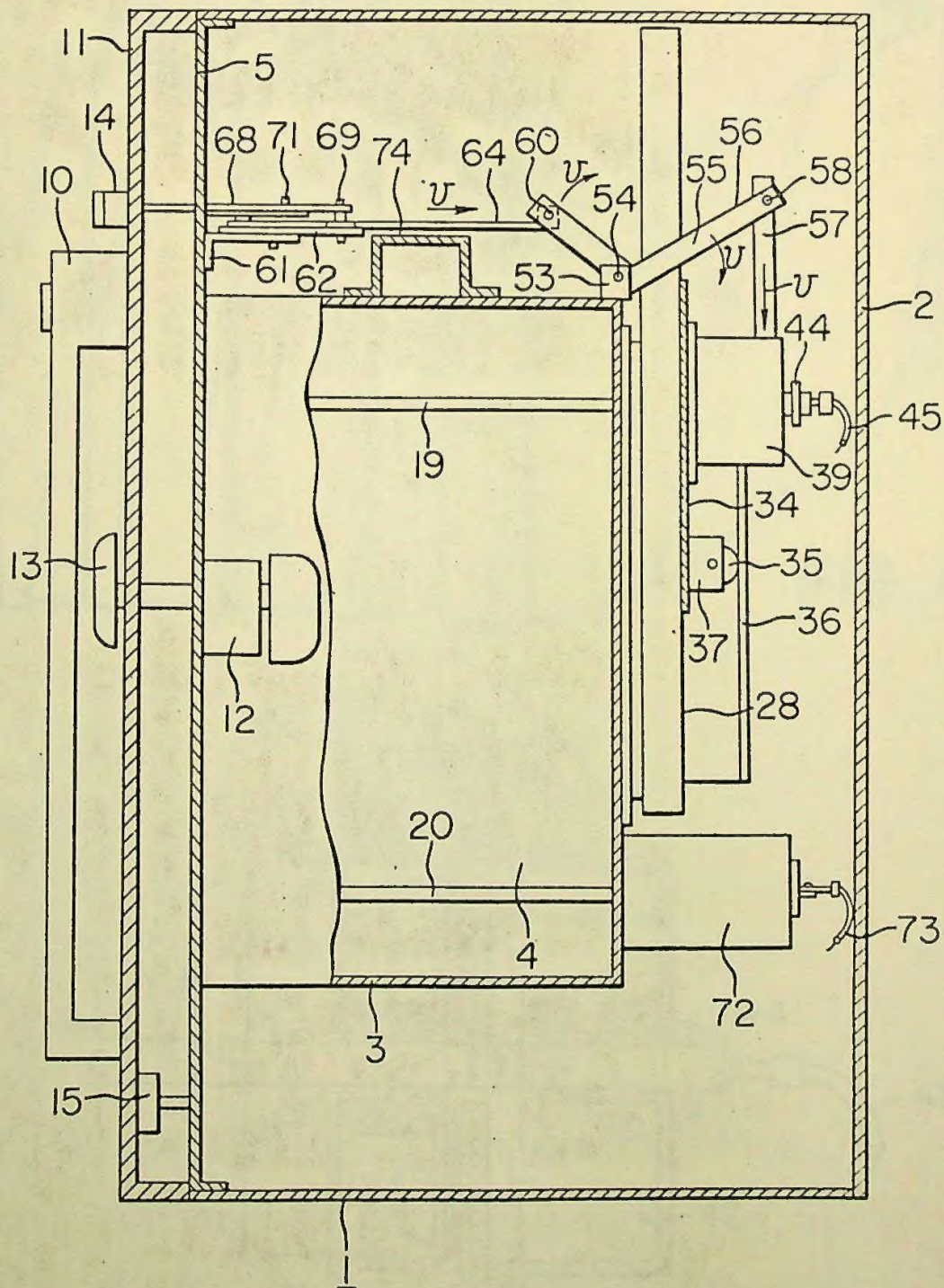








FIG. 5





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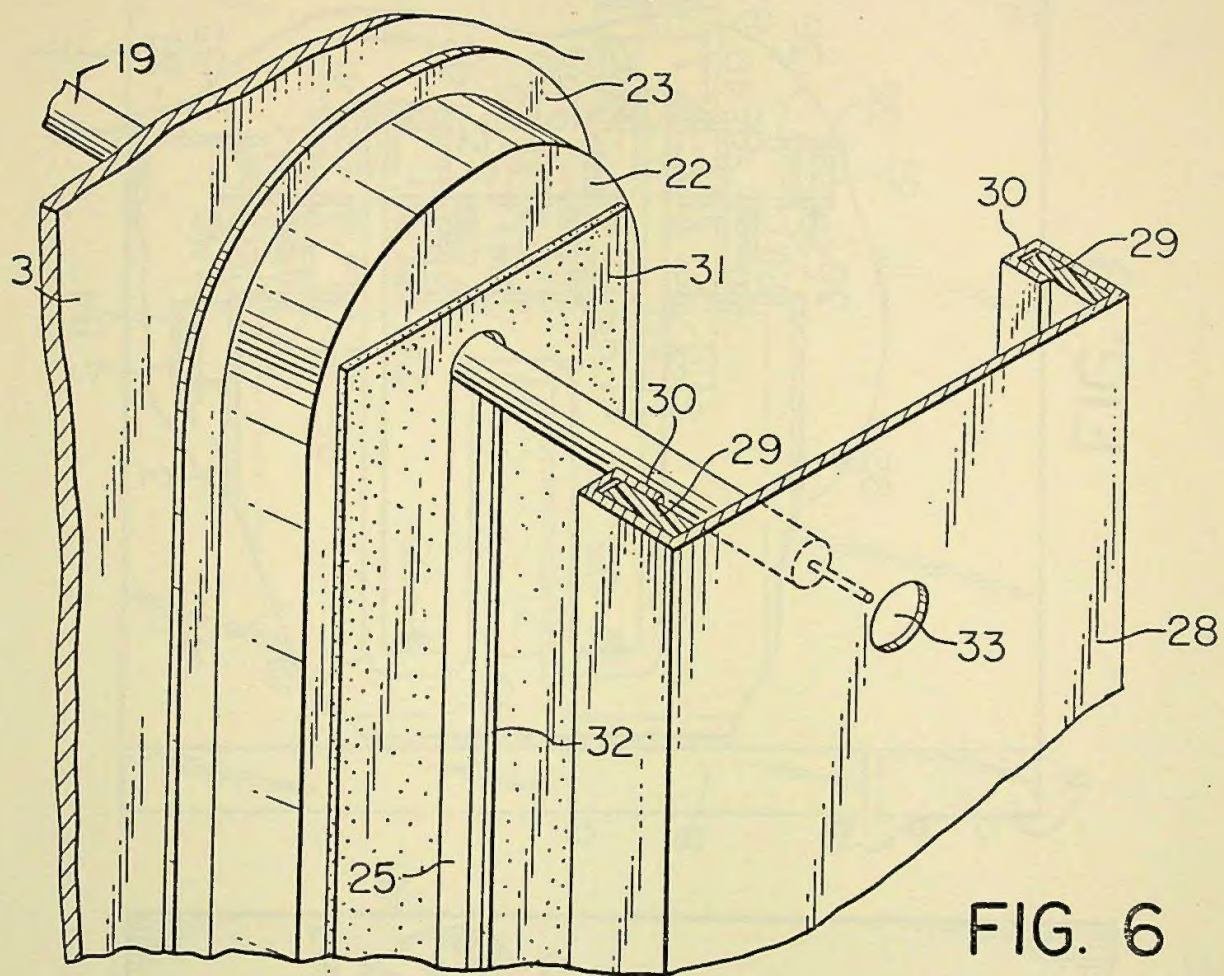


FIG. 6

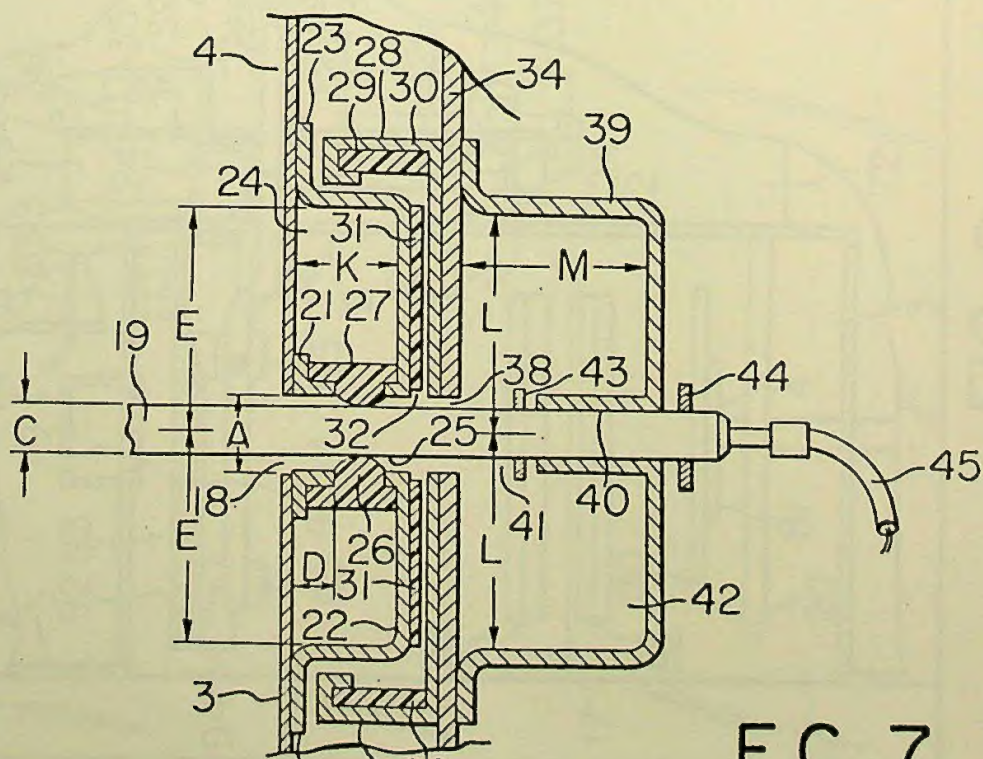


FIG. 7



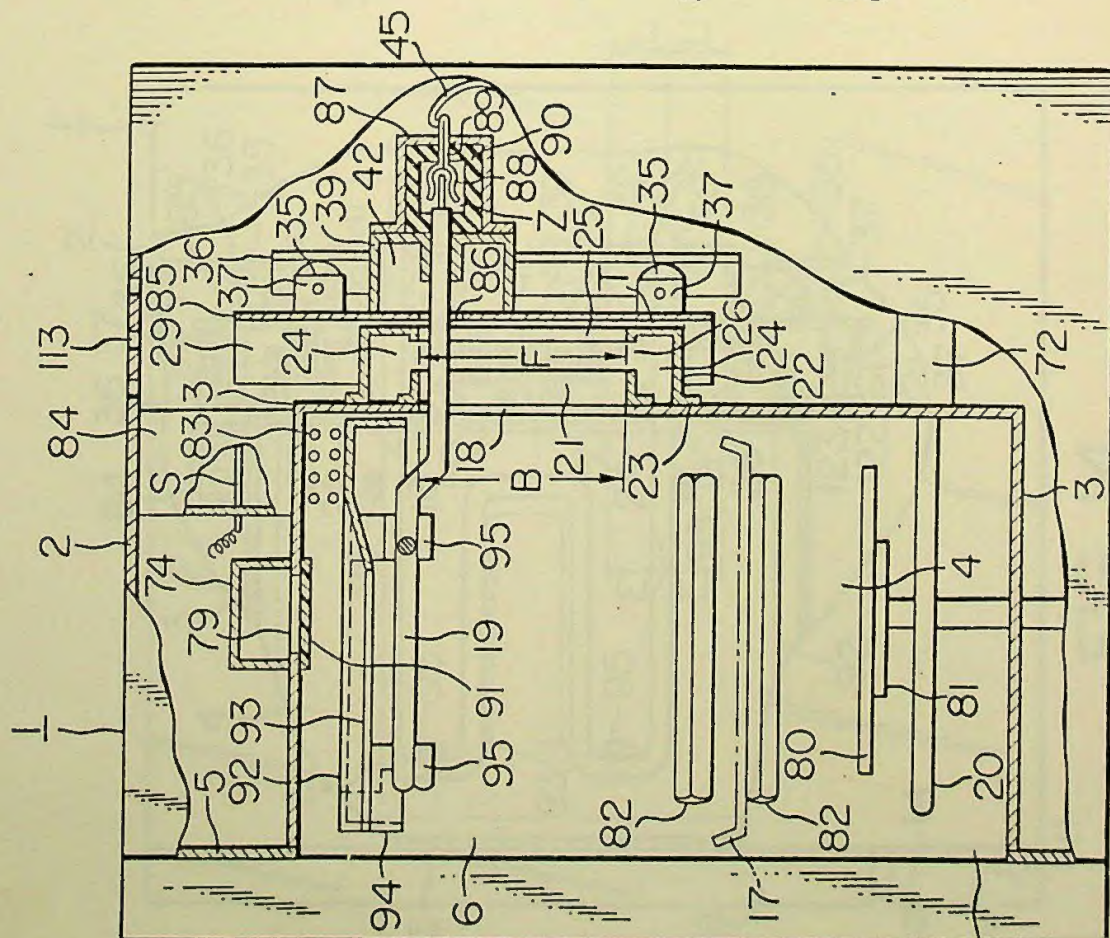


FIG. 8

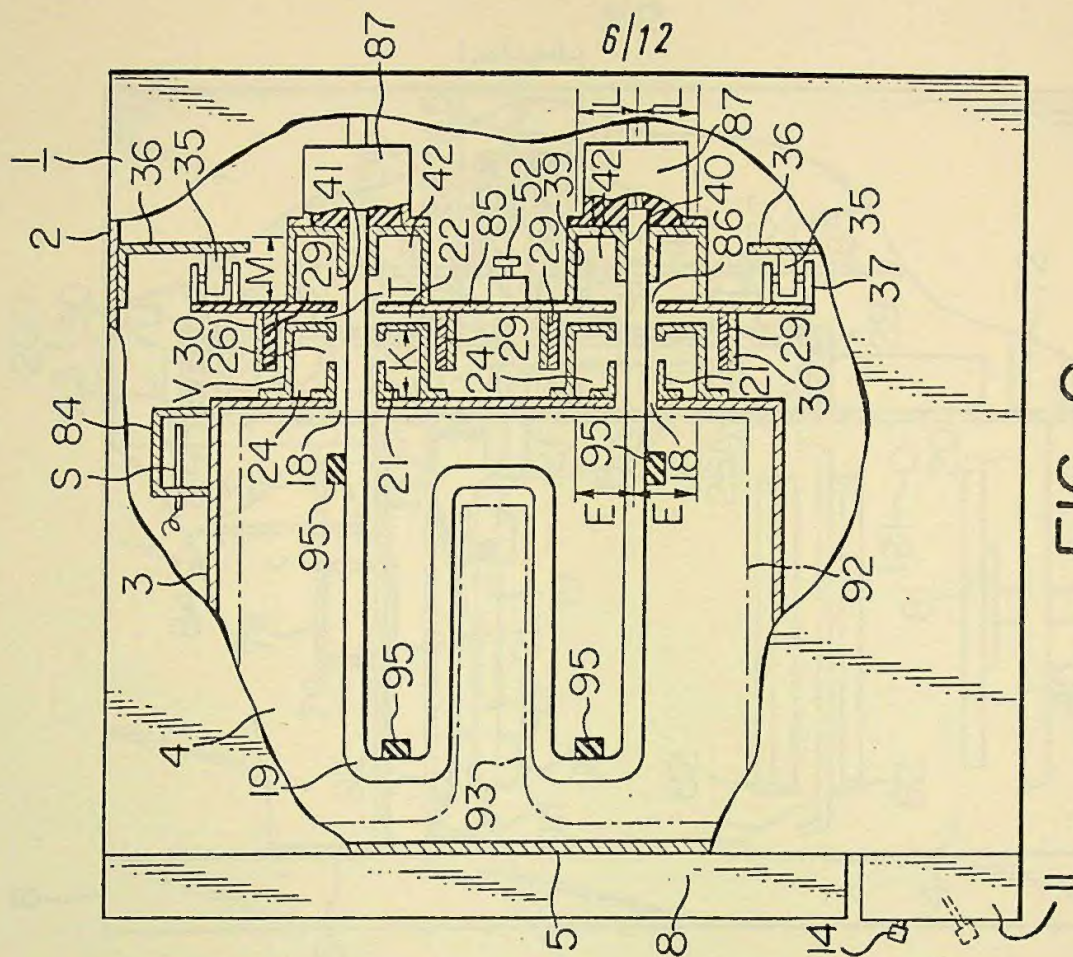


FIG. 9



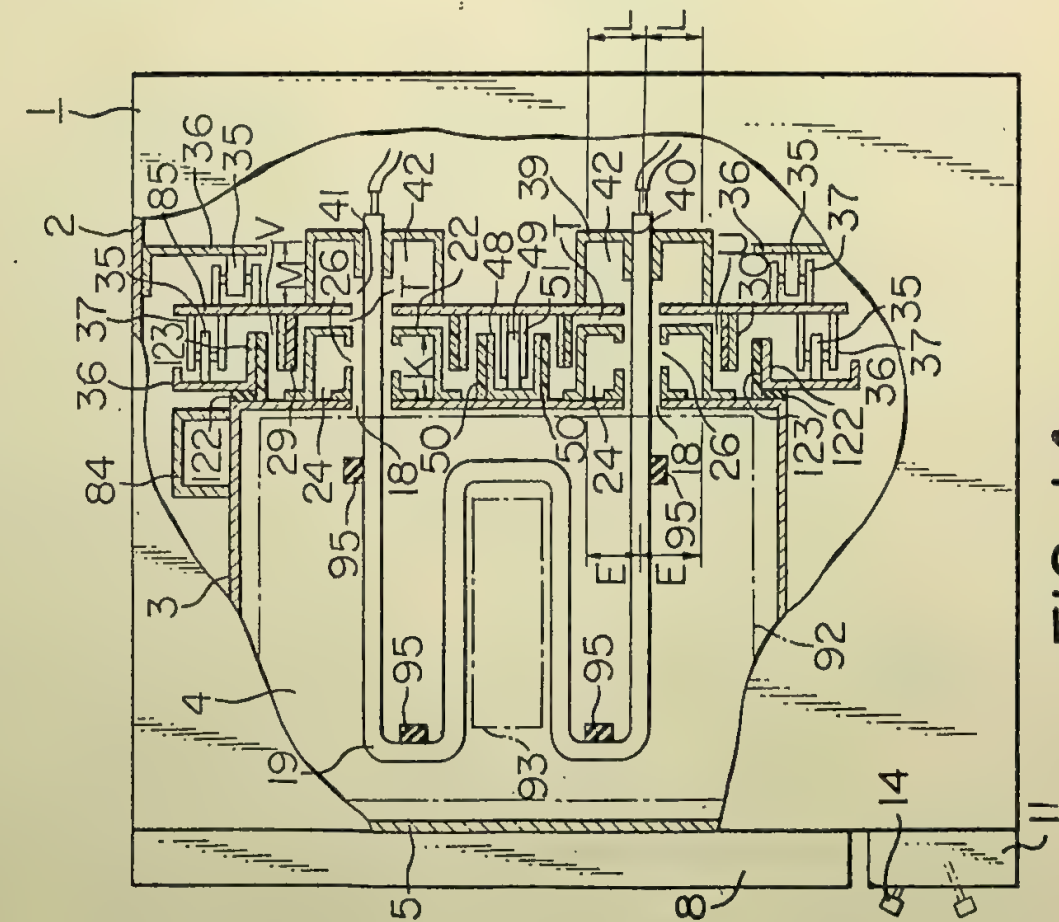


FIG. 14

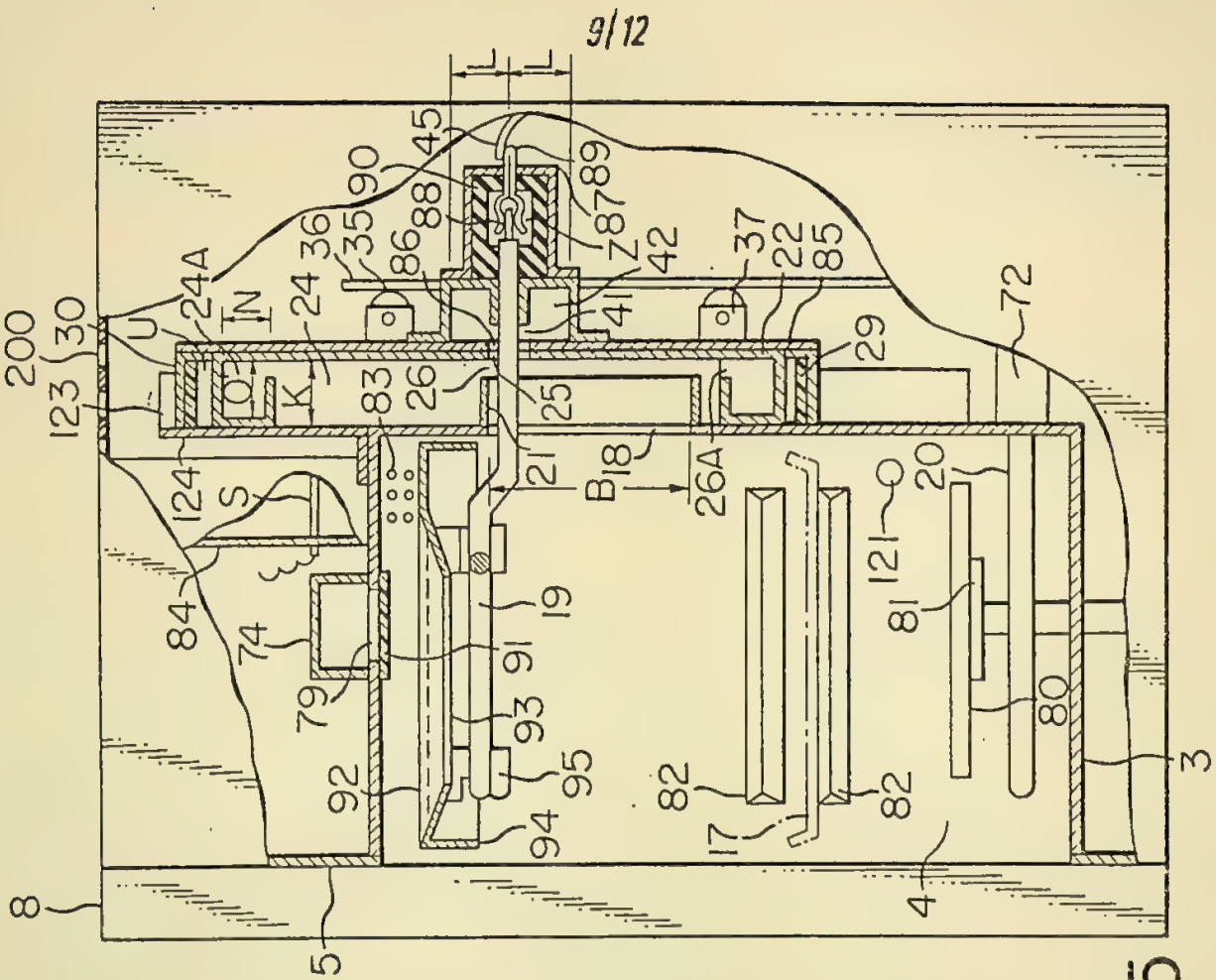


FIG. 15



FIG. 17

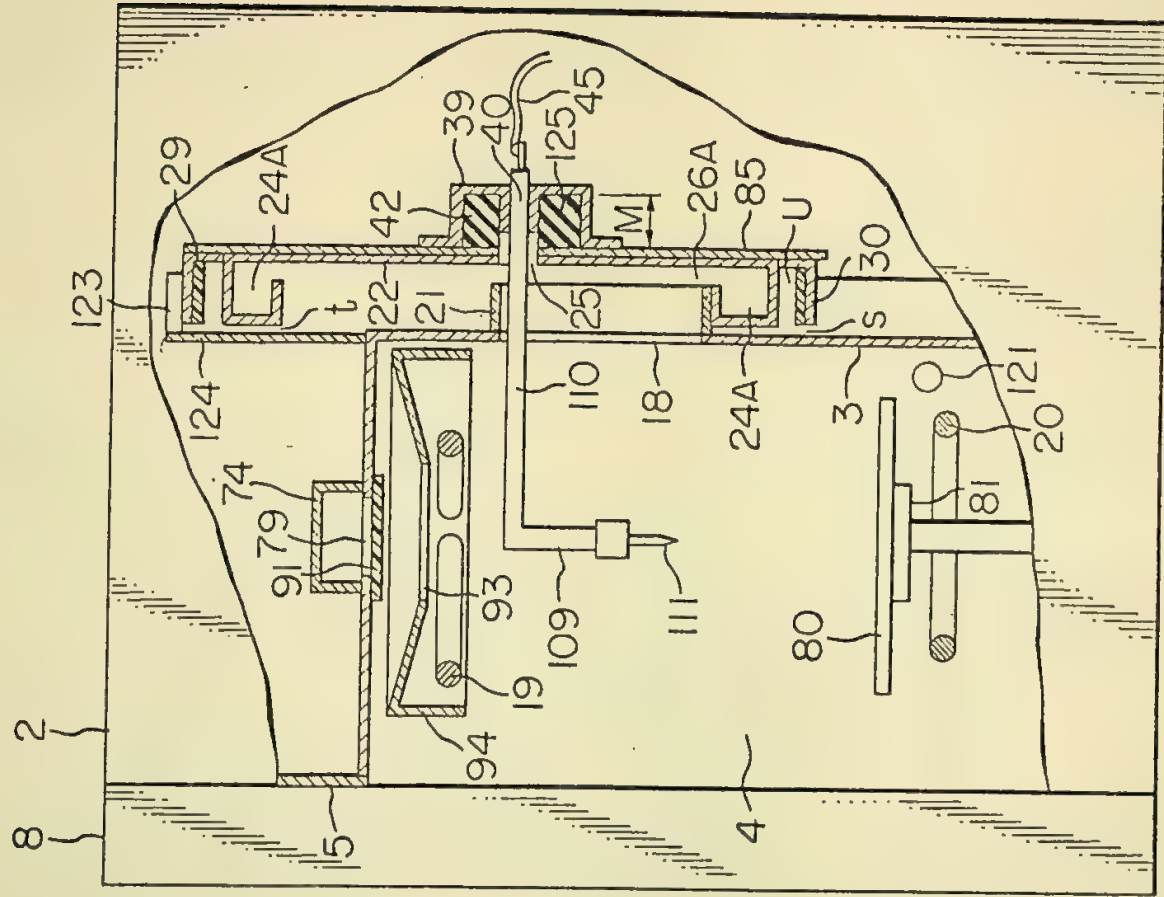


FIG. 17



FIG. 18

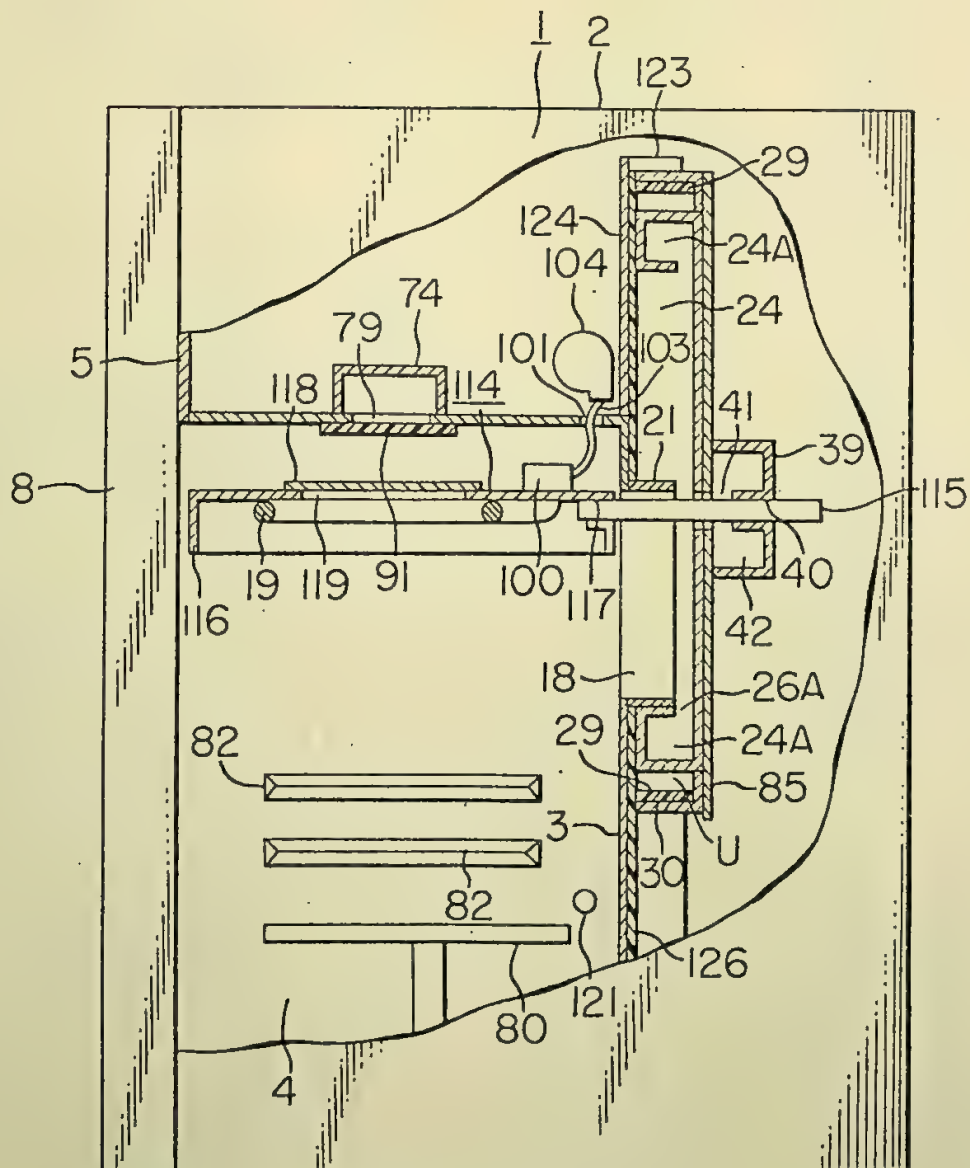




FIG. 19

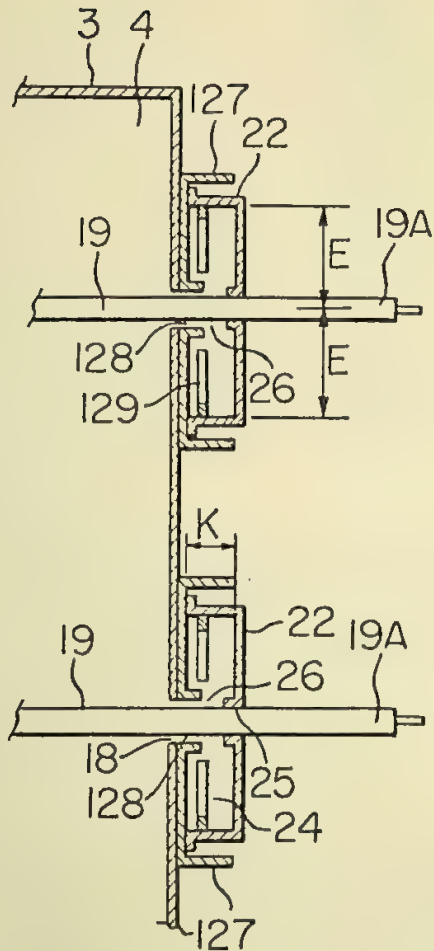


FIG. 21

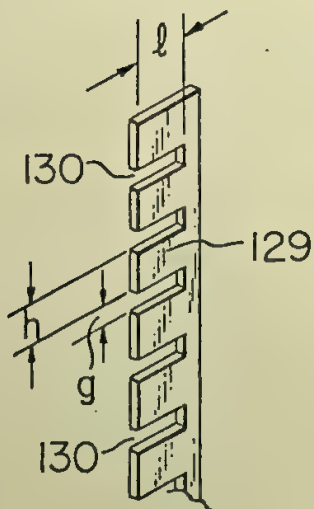


FIG. 20

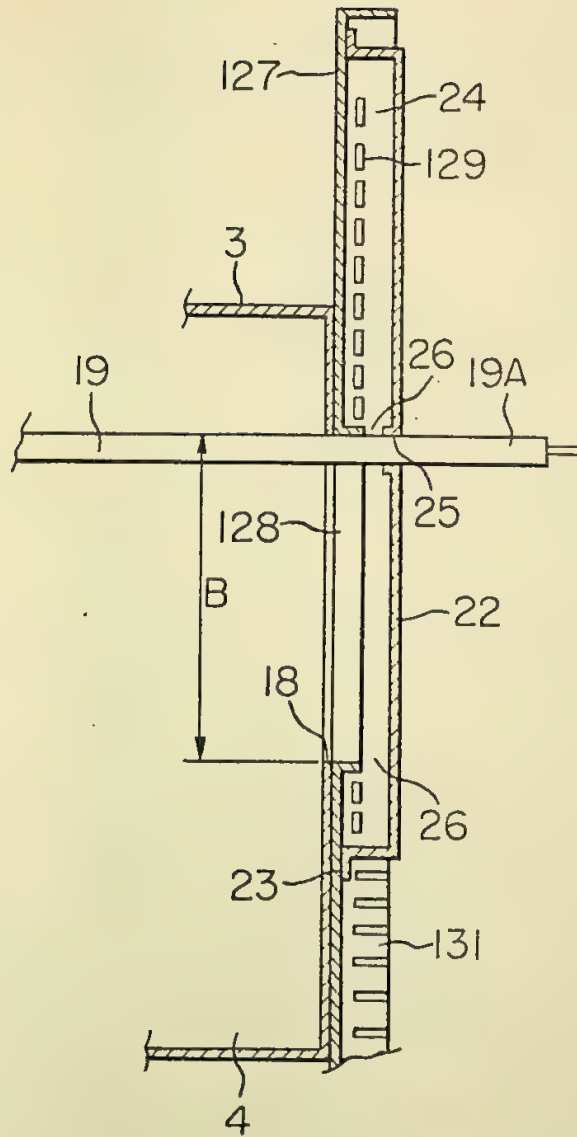
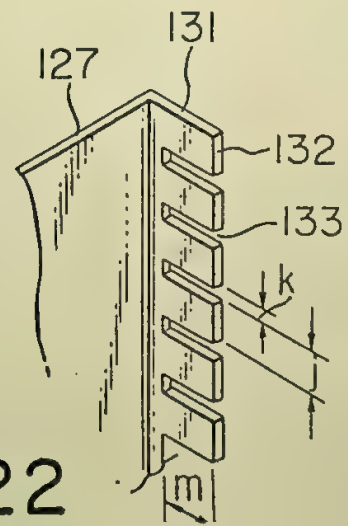


FIG. 22





In another embodiment of the present invention, the first space is vertically translatable, and the outer side walls and the back wall partly defining the first space is vertically translated with said extending member by the translation mechanism. In this aspect of the present invention, attenuator plates attenuating the electromagnetic waves propagating in the longitudinal direction of the elongated openings may be disposed in the first space parallel to the back wall of the first space, or outside the first space parallel to the side walls of the first space.

In both the above embodiments of the present invention, at least one further space having a communication port situated at path of the electromagnetic waves leaking from said first space, and/or at least one absorber situated at the path of electromagnetic waves leaking from said space may be disposed.

Said further space extinguish by choke effect said electromagnetic waves leaking from said first space, and said absorber absorbing and dissipates the energy of said electromagnetic waves leaking from said first space.

Preferably, the translation mechanism comprises stopper means which stops and holds the extending member at a plurality of positions which are spaced from each other by a predetermined distance substantially equal to a quarter of the fundamental wave-length of the electromagnetic waves.

The extending member may by one of the following:

- 1) a resistance heater disposed in the heating room,
- 2) a wire connecting said resistance heater to a power source,
- 3) a detector disposed in said heating room and detecting the temperature or the humidity of the food to be heated,
- 4) a wire connecting said detector to a power source,
- 5) a rod for supporting a reflector plate disposed in the heating room,
- 6) a rod for supporting a supporter for the container of food, which is disposed in the heating room, or
- 7) a rod for supporting a partition plate disposed in said heating room and partitioning said room into a plurality of portions thereof.

The invention will now be described further, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a microwave oven according to the present invention, showing the outward appearance thereof;

Figure 2 is a cutaway top view of the microwave oven of Figure 1, showing the microwave oven with the upper wall of the outer housing cut away, as viewed from the top;

Figure 3 is a sectional side view of the microwave oven of Figure 1, showing a vertical cross section of the microwave oven taken along the line III—III of Figure 2;

Figure 4 is a sectional plan view of the

microwave oven of Figure 1, showing a horizontal cross section of the microwave oven taken along the line IV—IV of Figure 3;

Figure 5 is a cross-sectional side view of the microwave oven of Figure 1, showing a vertical cross section of the microwave oven taken along the line V—V of Figure 2;

Figure 6 is a fragmental perspective view of a portion near one of a pair of the end portions of an upper heater disposed in the heating room of the microwave oven of Figure 1, showing the outward appearance of one of the pair of the leakage preventing chambers with the translating plate partially cut away along a horizontal line and removed halfway from said one of the pair of the leakage preventing chambers;

Figure 7 is a partial horizontal sectional view of the portion near one of the pair of end portions of the upper heater disposed in the heating room of the microwave oven of Figure 1, showing an enlarged cross section of the portion enclosed by line P of Figure 4;

Figure 8 is a fragmental sectional side view of a second microwave oven according to the present invention, showing a fragmental side cross section thereof;

Figure 9 is a fragmental sectional top view of the microwave oven of Figure 8, showing a fragmental horizontal cross section thereof;

Figure 10 is a fragmental sectional side view of a third microwave oven according to the present invention, showing a fragmental side cross section thereof;

Figure 11 is a fragmental sectional side view of a fourth microwave oven according to the present invention, showing a fragmental side cross section thereof;

Figure 12 is a fragmental sectional side view of a fifth microwave oven according to the present invention, showing a fragmental side cross section thereof;

Figure 13 is a fragmental sectional side view of a sixth microwave oven according to the present invention, showing a fragmental side cross section thereof;

Figure 14 is a fragmental sectional top view of seventh microwave oven according to the present invention, showing a fragmental horizontal cross section thereof;

Figure 15 is a fragmental sectional side view of an eighth microwave oven according to the present invention, showing a fragmental side cross section thereof;

Figure 16 is a fragmental sectional top view of the microwave oven of Figure 15, showing a fragmental horizontal cross section thereof;

Figure 17 is a fragmental sectional side view of a ninth microwave oven according to the present invention, showing a fragmental side cross section thereof;

Figure 18 is a fragmental sectional side view of a tenth microwave oven according to the present invention, showing a fragmental side cross section thereof;

Figure 19 is a fragmental sectional top view of



an eleventh microwave oven according to the present invention, showing a fragmental horizontal cross section of a portion at the backside of the heating room thereof including the

5 leakage preventing chambers;

Figure 20 is a fragmental sectional side view of the microwave oven of Figure 19, showing a fragmental side cross section of a portion at the backside of the heating room thereof including the

10 leakage preventing chambers;

Figure 21 is a perspective view of one of the attenuator plates disposed in the leakage preventing chambers of the microwave oven of Figure 19;

15 Figure 22 is a perspective view of one of the attenuator plates formed by the bent portions of the partition plates fixed to the back wall of the heating box of the microwave oven of Figure 10.

In the drawings, like reference numerals or

20 characters designate like or corresponding parts or dimensions.  
In Figures 1 to 7, a microwave oven embodying the present invention having a rod-shaped resistance heater which extends from the heating

25 room thereof to the exterior thereof and which is capable of being vertically translated is shown.  
The microwave oven comprises a main body 1, a metal outer housing 2 forming the outer shell of the main body 1, a heating box 3 forming a

30 heating room 4 therein, a metal front plate 5 which is fixed to the front peripheries of the heating box 3 and the metal outer housing 2 and has defined therein a front aperture 6 forming a window 7, and a door 8 which is capable of

35 closing and opening the front aperture 6 of the heating room 4, and is rotatably mounted to the main body 1 through a shaft 9.  
The microwave oven also comprises a door

40 handle 10 attached to the door 8, an operator's panel 11, a guide port 16 defined in the operator's panel 11 and guiding a knob 14 for the translation of a sheathed resistance heater 19 which is described later. The operator's panel 11 has

45 disposed thereon a knob 13 of a timer 12 which controls the microwave heating time and the resistance heater heating time, and an operation button 15 by which a switch (not shown) commanding the initiation of heating can be

operated. In the heating room 4, a supporter 17

50 for a food container may be disposed when necessary. A pair of vertically elongated openings 18 are defined in the back wall of the heating box 3 in the vertical direction with respect to the

microwave oven which is set in the proper

55 position thereof. As is shown in detail in Figure 7, the elongated openings 18 have a width A of 10 mm and length B in the vertical direction of 153 mm which is substantially equal to 5 times a

60 quarter of the fundamental wave-length of the electromagnetic waves utilized in the microwave oven, namely 30.6 mm, as the fundamental

frequency of electromagnetic waves utilized in the microwave oven is substantially equal to

when the length B of the elongated openings 18 is an odd multiple (namely 3 times, 5 times, 7 times, and so on) of a quarter of the fundamental wave-length of the electromagnetic waves filling the

70 interior of the heating room 4, the amount of the electromagnetic waves leaking or escaping from the interior of the heating room 4 through the elongated openings 18 is minimized. Of course, other lengths of the elongated openings equal to,

75 for example, 3 or 7 times a quarter of the fundamental wave-length of the electromagnetic waves utilized in the microwave oven may equally be chosen if such dimensions are preferable.  
In the heating room 4 of the microwave oven

80 are disposed two resistance heaters 19 and 20 sheathed in hollow metal cylinders of a diameter C of about 7 mm. Both ends of the heater 19 extend to the exterior of the heating room 4 through said openings 18. The end portions of the lower heater 20 also extend to the exterior of the heating room 4 through the back wall of the heating box 3.

A pair of partition plates 21 forming a pair of hollow oblong cylinders with base lines coinciding with the peripheries of said pair of elongated

90 openings 18 are fixed, through a pair of flanges thereof projecting outwardly from the front bases of said cylinders, to the annular portions of the exterior surface of the back wall of the heating box 3, which surround said peripheries. As shown in

95 Figure 7, the depth D of the partition plates 21 or the height in the axial direction of said cylinders is designed to be equal to about 7 to 8 mm. Thus the cylindrical portions of said partition plates 21 surround both end portions of said upper heater

100 19.

A pair of metal shield plates 22 having the form of oblong cylinders with open front bases have

flanges 23 projecting outwardly from the front

bases of the cylindrical portions of the metal shield

105 plates 22. The metal shield plates 22 are formed by a press machine from a single sheet of metal, and the flanges 23 are spot welded to the heating box 4.

Said pair of partition plates 21 and said pair of

110 shield plates 22 together with the peripheral annular portions of the exterior surface of the back wall of the heating box 3 enclose a pair of first choke chambers or first electromagnetic wave

leakage preventing chambers 24. A widthwise

115 depth E of the chambers 24 measured from the central points thereof along the direction of width of said chambers 24 is substantially equal to a quarter of the fundamental wavelength of the

electromagnetic waves utilized in the microwave

oven, and a height G of the chambers 24 in the

vertical direction of the microwave oven measured

from the peripheries of a pair of elongated

openings 25 defined in the back walls of the shield

plates 22 is equal to about 27 mm which is about

120 3 mm shorter than a quarter of said fundamental wavelength. Said elongated openings 25 defined in the shield plates 22 have a length F equal to about 130 mm.



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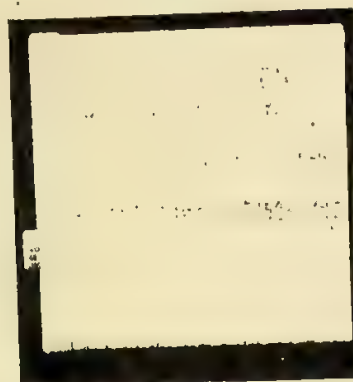
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Japanese Design Reg. No. 548,531  
 "Electronic Oven" Sanyo Electric Co, Ltd.  
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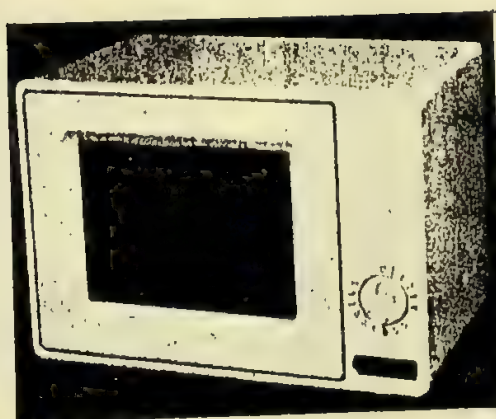
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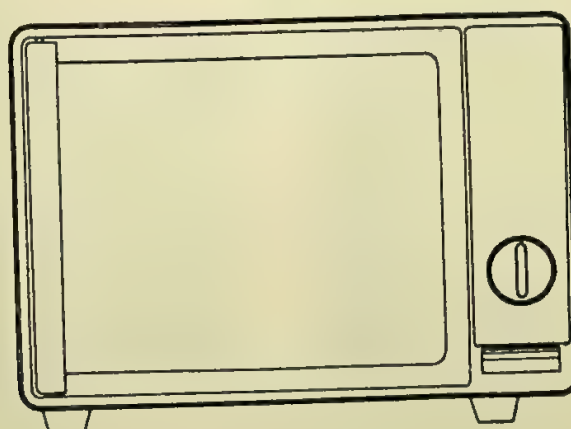
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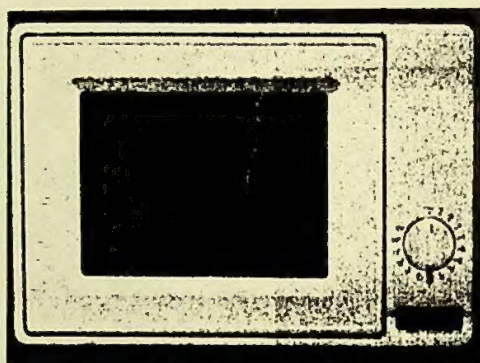
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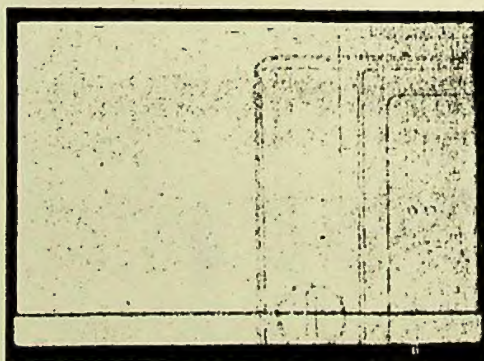
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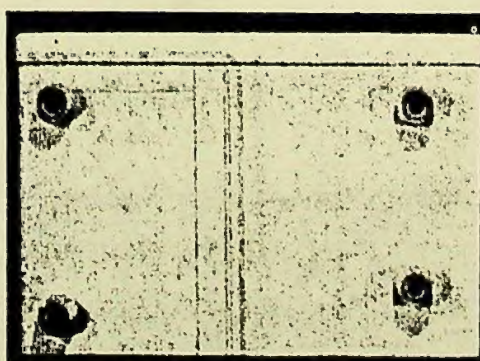
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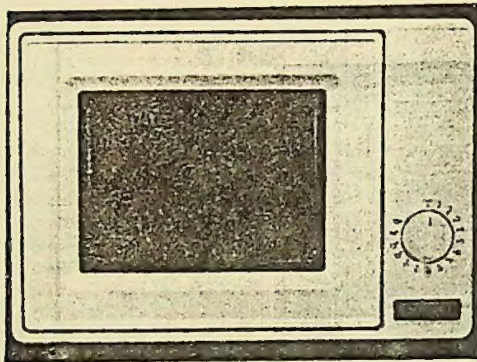
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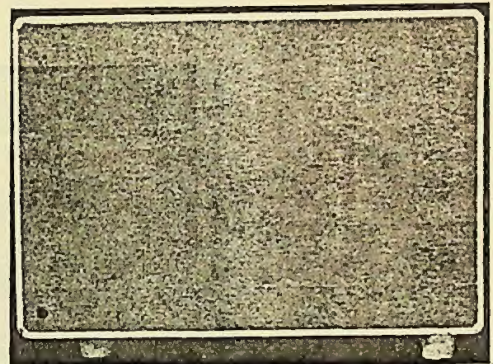
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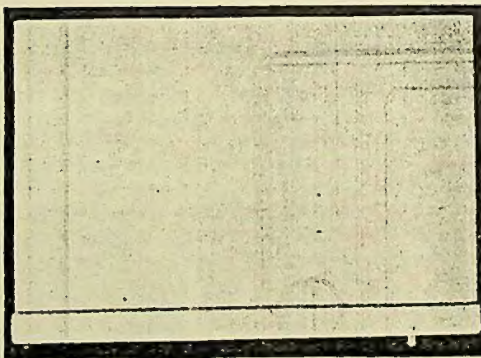
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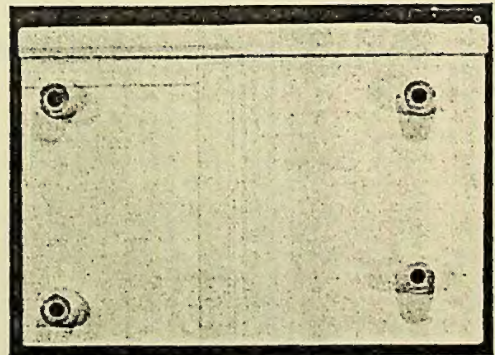
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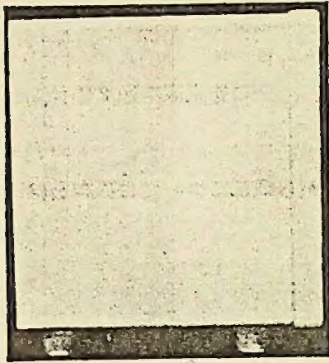


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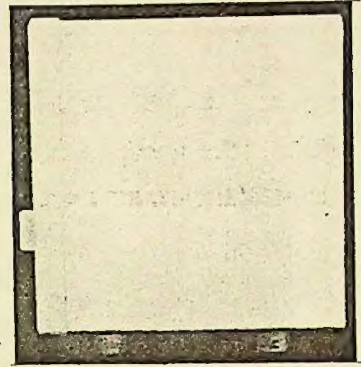




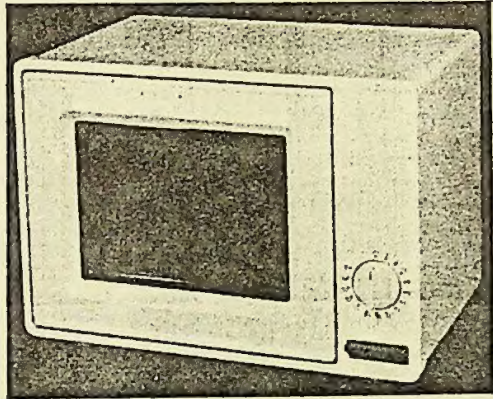
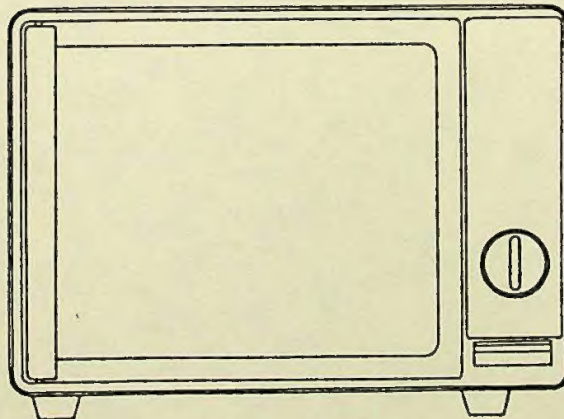
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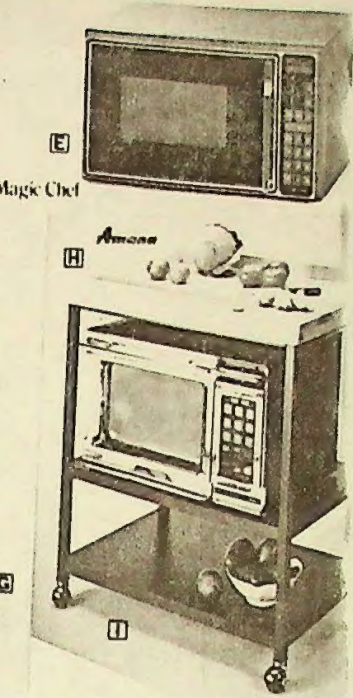
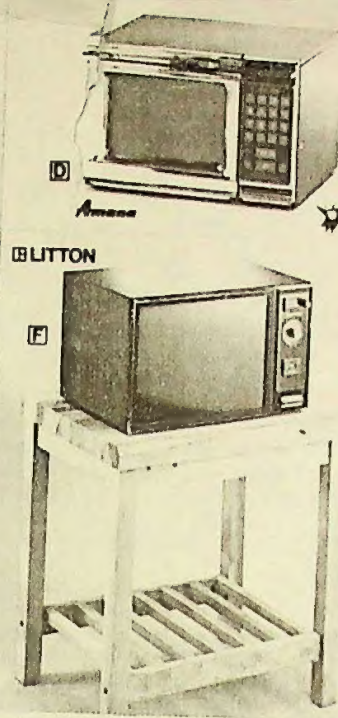
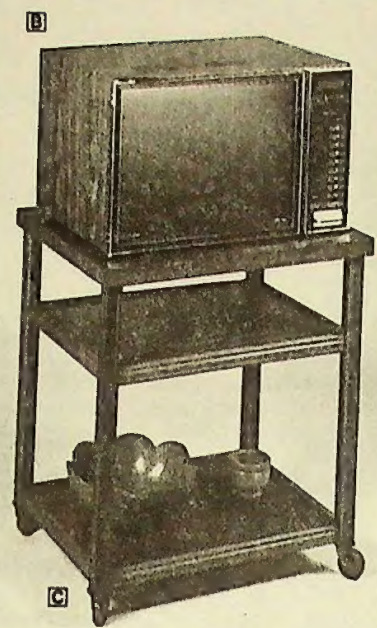
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## MICROWAVE OVENS & CARTS

**■ MICROWAVE CART.** Deluxe molded cart, ideal for microwave ovens. 3 rich woodgrain shelves on sturdy metal frame with mobile caster base. Usable shelf area: 19 3/4" x 26 1/4". Overall size: 31" h. x 26 1/2" l. x 21 1/2" d.  
**717 80K** Your Cost **\$29.50** ..... \$52.00

**■ LITTON 465 MEMORYMATIC MICROWAVE OVEN.** Features 99 minute electronic timer, and Memorymatic oven control. Vari-Temp automatic temperature control sensor allows you to program the results. Solid state Vari-Cook oven controls; solid state touch control; lighted digital display; minute timer. Extra large 1.2 cu. ft. usable oven interior. Complete with microwave cookbook. 24 1/4" w. x 17" d. x 15 1/16" h. 1600 watts; 115 V. AC.  
**699 65K** Your Cost **\$437.50** ..... \$499.00

**■ MICROWAVE OVEN CART.** A rugged mobile stand for microwave oven or table model TV. 3/4" thick Walnut vinyl laminated top shelf; heavy duty 2 1/2" wheel casters. Walnut woodgrain finish. 26 1/2" w. x 20 1/2" d. x 30 1/4" h.  
**766 50K** Your Cost **\$35.75** ..... \$43.95

**■ AMANA TOUCHMATIC II RADARANGE.** Automatic Temperature Control System; remembers up to 4 cooking programs; 10 Cookmatic Power levels. Digital clock with interval timer and tone signal and end of cycle tone plus automatic start time. Defrost and hold cycles. Over 1 cu. ft. usable capacity. 15" h. x 22 1/4" w. x 17 1/4" d. 1450 watts. 115 V. AC.  
**599 02K** Your Cost **\$569.75** ..... \$629.95

**■ MAGIC CHEF 317Z.** Touch programming and 3-stage memory. Big 1.1 cu. ft. oven. Concealed stirring system. 25" w. x 16 1/4" d. x 15" h. 1450 watts. 115 V. AC.  
**677 01K** Your Cost **\$467.50** ..... \$529.00

**■ LITTON 445 MINUTEMASTER.** Vari-Temp Automatic Temperature Control Vari-Cook Oven Control changes speeds. 99 minute digital timer. Automatic Hold Warm. Large 1.2 cu. ft. usable oven. 24 1/4" w. x 17" d. x 15" h. 1600 watts. 115 V. AC.  
**699 03K** Your Cost **\$378.75** ..... \$449.00

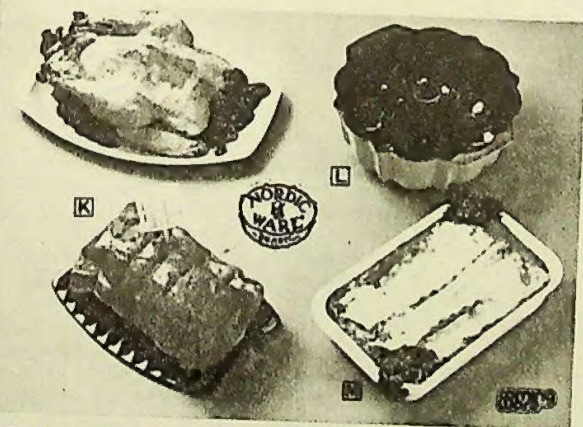
**LITTON 120 MINUTEMASTER.** Compact unit with Vari-Cook Oven Control. 25 minute dial timer. 24" w. x 14 1/2" d. x 13" h. 1250 watts. 115 V. AC.  
**699 12K** Your Cost **\$284.50** ..... \$329.00

**■ MICROWAVE BUTCHER BLOCK TABLE.** Selected hardwood butcher block counter top height table cart with oil finish and ball caster base. 2 1/2" thick top. 31" w. x 24" d. x 36" h.  
**673 02K** Your Cost **\$147.50** ..... \$189.95

**■ THE AMANA RR-9 TOUCHMATIC RADAR-RANGE.** Remembers how long to defrost, to wait for food temperature to equalize, how long to cook at the speed you select with the Cookmatic Power Shift. Digital electronic clock, pull-down door interior light, removable glass oven tray, automatic electric lock and stainless steel interior. 1 cu. ft. usable oven. 22 1/4" w. x 17 1/4" d. x 15" h. 1450 watts. 115 V. AC.  
**599 09K** Your Cost **\$479.50** ..... \$539.95

**■ THE WORK AND SERVE KITCHEN CART.** Heavy duty steel frame, convenient counter top high solid Maple butcher block surface with all around gray groove and 2" high backplash. Microwave oven compartment accepts unit up to 26 1/2" w. x 16 1/4" h. x 19 1/4" d. Overall size 30" w. x 35 1/4" h. x 20 1/4" d.  
**788 01K** Your Cost **\$79.50** ..... \$100.00

## MICROWAVE COOKWARE



**■ CORNING MICROWAVE SET.** 5 pc. set includes: 10" covered browning skillet; 8 1/2" x 11 1/2" cook and serve platter; two 15 oz. bowls. 242 page cookbook.  
**249 36E** Your Cost **\$22.97** ..... \$34.99

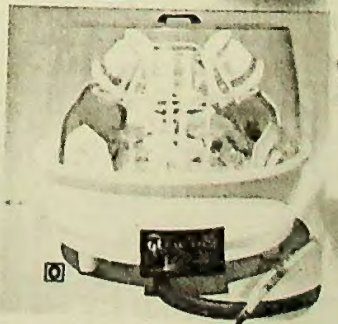
**■ NORDICWARE MICROWAVE SET.** 3 pc. set includes roast serving tray, microwave food thermometer and roasting rack with non-stick finish. Heavy duty, oven proof to 400°. Durable stain and shatter resistant.  
**527 14E** Your Cost **\$13.50** ..... \$21.90

**■ NORDICWARE BUNDT PAN.** Specially designed for use with microwave ovens. Tube pan for cakes, meatloaves, casseroles, etc. Non-stick finish.  
**527 13E** Your Cost **\$5.75** ..... \$7.98

**■ CORNING WARE FAST FOOD DISHES.** Especially designed for cooking frozen dinners and vegetables in microwave and conventional ovens. Each dish complete with cover.  
**249 32E** **\$8.77**—6 1/4" x 10 1/2" x 2" ..... \$12.99  
**249 31E** **\$5.95**—5 1/2" x 7" x 2" ..... \$8.99

**■ RIVAL OVEN SET.** 5 pc. Naturelles stoneware oven set. Designed for use with microwave or conventional ovens. Includes 2, 2 1/2 and 3 qt. casseroles and 2 covers, that nest for space saving storage. Complete with cook book.  
**238 63E** Cost **\$22.50** Set ..... \$32.95

**■ PORTABLE COUNTER TOP DISH-WASHER.** Non-electric, no installation. Washes and rinses a full service for 4. Perfect for apartments, students and bars. Durable, hydraulic system adapts to most faucets. White base, clear top, unbreakable. 21" diam x 19" h.  
**235 10E** Your Cost **\$29.90** ..... \$45.00\*



REFER TO FIRST PAGE FOR INFORMATION ON PRICING AND WARRANTIES

\*Reference Price

W. Ball & Co. 1979 p. 310 D7/351